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Volume XIX FEBRUARY, 1932 Number 2

REPORT OF THE COMMITTEE OF THE BOSTON SOCIETY OF CIVIL ENGINEERS ON "THE REPORT OF THE NEW ENGLAND RAILROAD COMMITTEE TO THE GOVERNORS OF THE NEW ENGLAND STATES, MAY, 1931"

YOUR Committee has carefully studied "The Report of the New England Railroad Committee" and has held meetings which were attended by every member of the Committee, and at which the report was thoroughly discussed.

In a communication addressed to President Sawtell of the Boston Society of Civil Engineers, the New England Council wrote as follows: —

> In the interests of securing uniformity, it is suggested that you ask your committee, in presenting its findings, to make unmistakably clear whether it concurs in or dissents from —
>
> (*a*) The conclusions of the majority.
>
> (*b*) The recommendations of the majority.
>
> (*c*) The dissenting statement of Mr. Richards and Mr. Jones concerning present Pennsylvania interest in the New Haven and Boston & Maine.
>
> (*d*) The Rhode Island minority proposals.

Your Committee unanimously concurs in (*a*) and (*b*), and unanimously dissents from (*c*) and (*d*).

J. P. ALEXANDER.
C. FRANK ALLEN.
FRANK M. GUNBY.
LEWIS E. MOORE.
FRANK B. WALKER.
CHARLES B. BREED, *Chairman.*

JUNE 29, 1931.

TRAFFIC AND OPERATION OF NEW ENGLAND RAILROADS

By John B. Babcock, 3d, Member, Boston Society of Civil Engineers *

(Presented before the Boston Society of Civil Engineers, October 21, 1931)

A brief review of present railroad transportation in New England should provide a background for determining a policy with respect to the New England railroads in the general consolidation of the railroads of the country into a limited number of systems. Although located in the extreme northeastern section of the United States and comprising only 2 per cent of the area, New England has 7 per cent of the population. Its inhabitants pay 8 per cent of the total Federal income tax, which indicates the importance of this section from a business and industrial standpoint. The fact that Boston is within 500 miles of the cities of New York, Philadelphia, Baltimore, Washington, Norfolk and Buffalo disproves the statement often made that New England occupies an isolated position with respect to the rest of the country. Forty million people, or one-third of the population of continental United States, live within this 500-mile radius. The New England ports are nearer the important European seaports than are the other ports on the Atlantic seacoast; the present "equalization" of ocean rates, however, prevents New England from obtaining much advantage from this shorter distance.

New England Railroads

The New England railroad system comprises 7,700 miles of road, with an investment in road and equipment (book value) of about $1,000,000,000. The following table shows comparative statistics of New England railroads and the total United States railroads for 1929: †

---

* Professor of Railway Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

† Data obtained from the "Report of the New England Railroad Committee to the Governors of the New England States, May, 1931," and from "Statistics of Railways in the United States, 1929," Interstate Commerce Commission.

	New England Railroads	Total United States Railroads	Per Cent of New England to Total
Mileage operated	7,700	260,600	3.0
Book value	$996,000,000	$25,465,000,000	3.9
Operating revenues	$307,000,000	$6,373,000,000	4.8
Operating expenses	$219,000,000	$4,579,000,000	4.8
Net income	$36,000,000	$977,000,000	3.7
Operating ratio	71.33	71.85	–
Tons of revenue freight carried	92,200,000	2,584,300,000	3.6
Tons of revenue freight originated	26,800,000	1,419,400,000	1.9
Revenue freight ton miles (1,000's)	10,536,000	450,189,000	2.3
Passengers carried	98,000,000	786,000,000	12.5
Passenger miles (1,000's)	2,791,000	31,165,000	9.0
Steam locomotives	2,400	61,300	3.9
Freight cars	57,900	2,324,000	2.5
Passenger train cars	4,300	53,800	8.0

The railroads run in a general east and west direction through Massachusetts, Connecticut and Rhode Island, and more or less north and south throughout Maine, New Hampshire and Vermont, there being no direct east-west routes in northern New England. The Boston & Maine, New York, New Haven & Hartford and the Boston & Albany, serving Boston, constitute 60 per cent of the mileage of the New England group, carry 70 per cent of the tonnage and receive 80 per cent of the gross revenue. The other carriers include the Maine Central, Bangor & Aroostook, Central Vermont, Rutland, Canadian National (Atlantic & St. Lawrence), Canadian Pacific (in Maine), Canadian Pacific (in Vermont) and the New York Connecting Railroad.

New York, New Haven & Hartford Railroad is the largest of the group, with a mileage of 2,130 and a book value of nearly half a billion dollars and earning almost one-half the entire gross revenue. Its line extends from western gateways at Maybrook, N. Y., and Harlem River through Connecticut, Rhode Island and southern Massachusetts to Boston, with branches to important industrial centers, such as Springfield, Holyoke, Worcester, Fitchburg and Lowell. During the past fifteen years, the New Haven has spent about $150,000,000 for improving its property; modern freight terminals have been built at Cedar Hill (near New Haven), Providence, Hartford and Worcester, with improved facilities at many other points. The South Station at Boston, in which the New Haven has an 80 per cent interest, has been made one of the most modern passenger terminals. The roadway and bridges have been improved to accommodate the larger and more efficient locomotives which have been placed in service. The New Haven is one of the first fifteen railroads in the country in gross revenue, and it ranks fourth in passenger traffic. Its freight traffic (revenue ton miles) increased over 20 per cent from 1921 to 1929. The New Haven was a pioneer in the field of motor transport, and it is now one of the largest users of buses and trucks in the country. The Pennsylvania Railroad and Pennroad Corporation (a holding company affiliated with it) together control 22.6 per cent of its voting stock.

Boston & Maine Railroad, next to the New Haven in size, with a mileage of 2,080 and a book value of nearly one-third of a billion dollars, earns about 25 per cent of the gross revenue of the New England group. It extends from a western gateway at Rotterdam Junction (Mechanicville and Troy), N. Y., through Greenfield and Fitchburg to Boston, with lines up the Connecticut River valley from Springfield to White River and Wells River. It serves central and northeastern Massachusetts, the entire state of New Hampshire and has three routes to Portland, Me. About $75,000,000 has been spent in the improvement of its property in the past ten years. A complete modernization of its freight and passenger terminals at Boston has been made, including retarder freight yards, and the new North Station with its adjoining hotel, industrial building, and the Boston Garden. A large retarder yard has been built at Mechanicville, and terminal improvements have been made at Worcester, White River Junction and other points. Track and rolling stock have been greatly improved. It now operates the largest mileage of "centralized traffic control" of any railroad in the country. It is also a large user of buses and tracks, and it was probably the first railroad in the country to develop an aerial passenger service. Freight ton miles have increased 3 per cent since 1921. The New Haven, through the Boston Railroad Holding Corporation, controls 26.4 per cent of its voting stock, and the Pennroad Corporation controls 17.7, the combined control by the New Haven and the Pennsylvania amounting to 44.1 per cent.

Boston & Albany Railroad, with a mileage of 400 and a book value of about $55,000,000, earns about 10 per cent of the gross revenue. It is a leased line of the New York Central Railroad. The main line extends from Albany, N. Y., to Boston through Springfield and Worcester, with branch lines to North Adams, Athol, Winchendon, Webster and other points. It does not carry much local traffic, serving primarily as a through line of the New York Central system to Boston. Durng the past decade its freight business has decreased about 10 per cent, as compared with increases of 20 and 3 per cent, respectively, on the New Haven and Boston & Maine. As stated above, these three railroads carry 70 per cent of the revenue tonnage and earn 80 per cent of the gross revenue of the New England railroads.

Maine Central Railroad, with 1,120 miles of line (15 per cent of the total), accounts for but 7 per cent of the gross revenue. It radiates from Portland, Me., throughout southern and eastern Maine with lines to St. Johnsbury, Vt., and Beecher Falls, N. H. Its traffic, which is relatively light, has changed little in the past ten years. No other railroads have control of its stock: Lee, Higginson & Company, a banking firm, at present holds about 25.7 per cent of its voting stock.

Bangor & Aroostook Railroad is a typical local road with practically no through traffic. It has 610 miles of line, extending north from Searsport (south of Bangor) to Greenville, Houlton, Van Buren and Fort Kent, Me. Potatoes and lumber, originating on its lines, form a large share of the traffic. Lee, Higginson & Company holds about 18.8 per cent of the voting stock.

Central Vermont Railway, controlled by the Canadian National, runs from New London on Long Island Sound, through Palmer, Mass., Brattleboro and Bellows Falls to White River Junction, Montpelier, Essex Junction (near Burlington, Vt.) and to St. Johns, P. Q., where it joins the Canadian National. It is primarily a "bridge" route, carrying little local traffic. Its freight traffic has increased 34 per cent since 1921; this road furnishes one of the important "differential" routes for west bound freight.

Rutland Railroad, controlled 50 per cent by the New Haven and 50 per cent by the New York Central, has 410 miles of line and receives 2 per cent of the gross revenue of the New England group. It extends from Chatham, N. Y., and Bellows Falls, Vt., northerly to Rouses Point, and thence westerly to Ogdensburg on the St. Lawrence River. It is a heavy carrier of milk, this alone constituting one-sixth of its revenue.

The other New England railroads, no one of which accounts for more than 1 per cent of the gross revenue, are: *Canadian National* (Atlantic & St. Lawrence) from Sherbrooke, P. Q., to Portland, Me.; *Canadian Pacific* (*in Maine*) from Megantic, P. Q., through Greenville to Mattawamkeag, Me.; *Canadian Pacific* (*in Vermont*) from Newport, Vt., to Woodsville, N. H. (Wells River, Vt.); and the *New York Connecting Railroad*, a short line near New York, controlled jointly by the New Haven and the Pennsylvania.

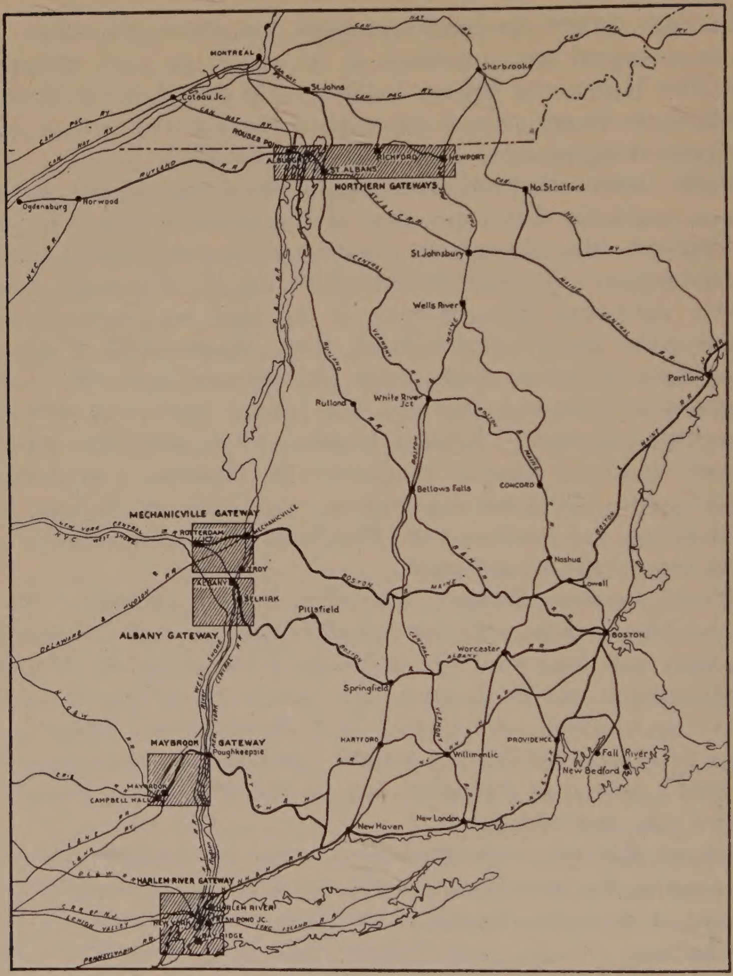


Fig. 1. — Location of New England Gateways in Relation to Principal Railroad Routes

For presentation in this diagram the northern gateways are shown as a single shaded area. Actual points of interchange are in some instances located at a distance from this area. For example, the interchange of the Rutland with the New York Central is at Norwood, New York; of the Maine Central with the Canadian National, at North Stratford, New Hampshire, and with the Canadian Pacific at St. Johnsbury, Vermont; of the Boston & Maine with the Canadian Pacific, at Wells River, Vermont; and of the Central Vermont with the Canadian National, at St. Johns, Quebec. The connection of the Bangor & Aroostook with the Canadian Pacific at Brownville Junction and with the Canadian National at St. Leonard, and the connection of the Maine Central with the Canadian Pacific and the Canadian National at Vanceboro, are not shown on this diagram.

(From Report of New England Railroad Committee, May, 1931)

New England Rail Gateways

The railroads of New England interchange freight with railroads outside of this territory at four Hudson River gateways and at a group of northern gateways. *Hudson River Gateways* include *Harlem River*, N. Y., where the *New Haven* interchanges via New York Harbor with the Pennsylvania, Lehigh Valley, Central Railroad of New Jersey, Long Island, and New York Central; *Maybrook*, N. Y., which the *New Haven* reaches via the Poughkeepsie Bridge and where it interchanges with the Erie–New York, Ontario & Western–New York Central and the two bridge lines, Lehigh & Hudson River and Lehigh & New England; *Albany*, where the *Boston & Albany* (New York Central leased line) interchanges with the Delaware & Hudson and the New York Central; and *Mechanicville* (including Rotterdam Junction and Troy), where the *Boston & Maine* interchanges with the Delaware & Hudson and the New York Central.

Northern gateways include the following principal points: *Canadian Pacific*, with Boston & Maine at Wells River, Vt., Central Vermont at Richford, Vt., Maine Central at Vanceboro, Me., Bangor & Aroostook at Brownville Junction, Me.; *Canadian National*, with Boston & Maine at White River Junction, Vt. (via Central Vermont), Central Vermont at East Alburgh, Vt., Rutland at Rouses Point, N. Y., Maine Central at North Stratford, N. H., and Bangor & Aroostook at St. Leonard, N. B.; *New York Central*, with Rutland at Norwood, N. Y.; *Delaware & Hudson*, with Rutland and Central Vermont at Rouses Point, N. Y.

New England railroads *receive* in interchange through these gateways more than twice the number of loaded cars they *deliver*.

	Loaded Cars Received	Loaded Cars Delivered	Total
1922	1,097,391	443,347	1,540,738
1929	1,392,523	648,508	2,041,031

The following table shows the total interchange of loaded cars at the different gateways for 1922 and 1929:*

---

* From the "Report of the New England Railroad Committee," May, 1931.

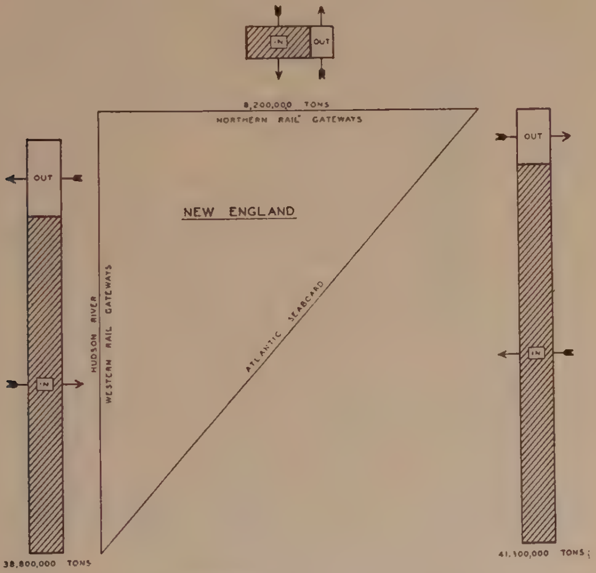
	1922	1929	Per Cent Increase
Total interchange at —			
Hudson River gateways:			
Harlem River	366,992	463,641	26.3
Maybrook	216,926	332,091	53.1
Albany	371,458	444,098	19.6
Mechanicville	336,592	422,421	25.6
Northern gateways	248,770	378,780	52.3
All gateways (loaded cars)	1,540,738	2,041,031	32.5

The largest increases have taken place during this period at Maybrook and the northern gateways. In 1929, 18.6 per cent of all cars delivered out of New England were routed over the Canadian roads (Canadian Pacific and Canadian National), and 12.3 per cent of all loaded cars received into New England came over the Canadian routes. A large part of the outbound movement via Canadian roads represents traffic which carries the differential (lower) freight rate which has always been considered of great importance to New England manufacturers.

Bridge Lines. — In considering interchange of New England railroads with their connections outside of New England, it is important to understand the relation of the so-called "bridge lines" to the New England roads. Bridge, or "overhead," traffic is freight received by a carrier from its connections and delivered by it to other connections. The Delaware & Hudson, Lehigh & Hudson River and Lehigh & New England are the important bridge lines for the New England carriers. The Delaware & Hudson serves as a bridge route for the Boston & Maine at Mechanicville, connecting with the Erie, Lehigh Valley and Lackawanna at Binghamton, N. Y., and with the Central Railroad of New Jersey, Pennsylvania and Lehigh Valley at Wilkes-Barre, Pa. The Lehigh & Hudson River at Maybrook connects the New Haven with the Central Railroad of New Jersey (and through it with the Reading and the Baltimore & Ohio), Lackawanna, Lehigh Valley, Erie, New York, Ontario & Western and the Pennsylvania. The Lehigh & New England via Maybrook connects the New Haven with the Central Railroad of New Jersey, Reading, Lackawanna, Lehigh Valley, Erie and the New York, Ontario & Western.

After allocating the bridge traffic of these three railroads, the principal connections of the New England roads rank about as follows, based on total loaded car interchange in 1929:

	Per Cent		Per Cent
New York Central	32	Erie	7
Pennsylvania	18	Delaware & Hudson	6*
Central Railroad of New Jersey	10	Lehigh Valley	5
Canadian Pacific	8	Lackawanna	4
Canadian National	7	New York, Ontario & Western	3



Total Movement over All Boundaries

Shipped into New England	73,600,000 tons
Shipped out of New England	14,700,000 tons

Fig. 2. — The Movement of Freight Traffic Into and Out of New England over All Boundaries, by Rail and by Water, 1929

(From Report of New England Railroad Committee, May, 1931)

Of the New England railroads, the Central Vermont carries the largest percentage of bridge traffic (55 per cent of its total). The Bangor & Aroostook, an originating and terminal road, has bridge traffic amounting to only 1.7 per cent. The interchange between railroads *within* New England is as follows: 40 per cent of the New Haven's interchange is with other New England carriers, 57 per cent of the

---

* Local and terminal traffic only.

Boston & Maine's, 38 per cent of the Boston & Albany's, 81 per cent of the Maine Central's, 84 per cent of the Bangor & Aroostook's, 58 per cent of the Central Vermont's, and 38 per cent of the Rutland's.

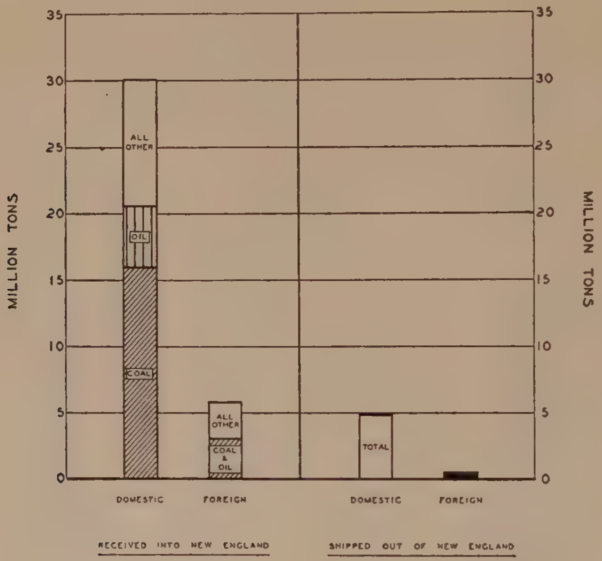


FIG 3.—WATER-BORNE COMMERCE OF THE NEW ENGLAND PORTS

Traffic moving over the Atlantic Seaboard in 1929

(From Report of New England Railroad Committee, May, 1931)

RAIL AND WATER TRAFFIC INTO AND OUT OF NEW ENGLAND

In 1929 the total tonnage moved into and out of New England over all boundaries was 88,300,000 tons, of which 73,600,000 tons (or five-sixths of the total) was inbound, as follows:

	Tons
Hudson River gateways, inbound	31,600,000
Hudson River gateways, outbound	7,200,000
Northern gateways, inbound	6,050,000
Northern gateways, outbound	2,150,000
Total rail, inbound	37,650,000
Total rail, outbound	9,350,000
Water, inbound	36,200,000
Water, outbound	5,100,000
Grand total	88,300,000

Of the water-borne commerce received into New England, five-sixths was domestic and one-sixth foreign; coal and oil accounted for over two-thirds of the inbound domestic traffic. Of the outbound water commerce, foreign was not over one-fifth of the total. While coal and oil make up two-thirds of the inbound water-borne commerce, coal amounts to only 21.7 per cent of the *total* revenue freight tonnage carried by New England railroads and 13.7 per cent of the total freight revenue of these roads.

Character of Rail Traffic in New England

The classification of freight traffic (tons carried) on the New England roads is as follows:

	Per Cent
Agricultural products	13.8
Animals and products	2.9
Products of mines	28.4
Products of forests	8.3
Manufactures and miscellaneous	39.7
Total carload	93.1
L. C. L. freight	6.9
Total all freight	100.0

The large tonnage of potatoes originating on the New England railroads accounts for the relatively high value of agricultural products; coal is about 75 per cent of total products of mines. The high percentage of manufactures and miscellaneous and less carload freight (L. C. L.) shows the relatively high grade of freight carried in the New England territory. This is also shown by the fact that the average revenue per ton mile of freight in New England is nearly 1.8 cents, compared with less than 1.1 cent for the United States railroads as a whole.

In studying the traffic of New England the *value* of the *products* carried as well as the *tonnage* carried is important. Although the outbound rail tonnage is only 20 per cent of the total inbound and outbound, it represents a very important traffic to the railroads outside of New England, due to the relatively high classification it takes. Also, if the coal traffic is deducted, a comparison of the remaining inbound tonnage and the outbound tonnage presents a different picture.

Operating Efficiency

Railroad operation has been greatly improved throughout the country during the past decade, *i.e.*, since the return to private management following the period of Federal control. That the New England railroads have been among the leaders in the improvement of their properties and operating methods is clearly shown by a comparison of the 1922 and 1929 "Index of Operating Efficiency." This index, developed by Dr. Julius H. Parmelee, Director of the Bureau of Railway Economics, takes into consideration the following factors: freight car miles and net ton miles per car day, gross and net tons per freight train, gross and net ton miles per freight train hour, freight and passenger locomotive miles per locomotive day, percentages of serviceable freight and passenger locomotives, percentage of serviceable freight cars, fuel consumption per 1,000 gross ton miles (freight) and per passenger train car mile.

INDEX OF OPERATING EFFICIENCY

(1920–1924=100)

	New England	United States (excluding New England)
1922	97.4	97.2
1929	135.6	120.4

The following table shows selected operating statistics for the New England roads for 1922 and 1929 and the percentage improvement:

	1922	1929	Per Cent Increase
Freight train speed between terminals (m. p. h.)	10.7	12.8	19.6
Gross ton miles (exclusive of locomotive and tender) per freight train hour . .	11,537	19,511	69.0
Net ton miles (exclusive of locomotive and tender) per freight train hour . .	4,788	7,632	59.4
Gross tons per freight train (exclusive of locomotive and tender) . . .	1,075	1,522	41.5
Net tons per freight train . . .	446	595	33.4
Freight car miles per car day . . .	16.7	27.8	66.5
Net tons per loaded car	20.7	20.5	1.0*
Coal per 1,000 gross ton miles (inclusive of locomotive and tender) . . .	180	121	32.8*

* Decrease

Comparisons are made between 1922 and 1929 because those are the respective years used in the "Report of the Joint New England Railroad Committee" (Storrow report, 1923), when consolidation plans were first studied, and in the current report of the "New England Railroad Committee" (May, 1931) on the complete consolidation plan of the Interstate Commerce Commission (December 15, 1929, Interstate Commerce Commission, 522) and the Four-Party Trunk Line Plan.[*] In 1922 the railroads had been operated under private management for less than two years (following Federal control), and many roads, including the large New England carriers, were in poor financial and operating condition. In 1929, however, the railroads throughout the country had reached the highest efficiency ever attained, and this was particularly true of the New England railroads as indicated by the 1929 "Index of Operating Efficiency." At the present time, although depressed business conditions and competition by other forms of transportation have seriously curtailed the amount of traffic handled, the railroads are maintaining a high standard of operating efficiency.[†]

Operating improvements have been principally due to the use of larger and more efficient locomotives; strengthening of track and bridges; revision of passenger terminals and freight yards, including the application of "car retarders;" adoption of modern signaling methods, including the substitution of "centralized traffic control" on some sections in lieu of operation by train orders; and the use of motor transport (buses and trucks) for terminal and line operation, to effect savings in cost and to meet highway competition. Many of these points have been stressed in describing the specific improvements which have been made on the Boston & Maine and on the New Haven. One illustration will suffice to show the speeding up of freight train operation. In the Storrow report (1923) it was stated that it took an average of eighty-three hours for freight car movement on the Boston & Maine from its western gateway at Rotterdam Junction, N. Y., to Boston (210 miles), and the committee recommended that this time could be reduced to fifty-one hours, — *today the Boston & Maine takes about eighteen hours for this movement.*

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[*] The Four-Party Plan, now under consideration by the Interstate Commerce Commission, comprises the Pennsylvania, New York Central, Baltimore & Ohio, Chesapeake & Ohio–Erie group (Van Sweringen system). Under this plan the railroads interchanging with New England carriers would be assigned as follows: Lackawanna (Delaware, Lackawanna & Western) and the New York, Ontario & Western to the New York Central; Central Railroad of New Jersey and Lehigh & Hudson River to the Baltimore & Ohio; and the Lehigh Valley to the Chesapeake & Ohio–Erie group. The Delaware & Hudson and the Lehigh & New England would be assigned to the four trunk lines jointly.

[†] For 1931 the Boston & Maine earned a net income of $3,377,280, compared with $5,993,841 in 1929; the New Haven earned a net income of $9,179,869, compared with $22,296,268 in 1929.

Economies have been effected by joint operation at points served by two railroads; *e.g.*, at Worcester and Springfield the New Haven operates the terminal properties of the New Haven and Boston & Maine, while at Lowell and Fitchburg the Boston & Maine operates the terminals of these two roads. At White River Junction, Vt., the Boston & Maine operates the terminal for the Boston & Maine and Central Vermont.

Better utilization of locomotives has been obtained by lengthening of engine runs. At present "thru" locomotives are operated in passenger service between Boston and Montreal (330 miles) on the Boston & Maine–Canadian Pacific and the Boston & Maine–Canadian National routes. In freight service New Haven locomotives are used on the New Haven–Boston & Maine route from New Haven, Conn., to Portland, Me., via Worcester, Mass., and on some runs from Worcester to Boston; and Boston & Maine engines are operated on the Boston & Maine–New Haven run from White River Junction to New Haven via Springfield.

From the standpoint of the shipper the most noteworthy improvement is the expedited movement of freight, providing service at freight rates comparable to that formerly obtained by "express" service; this applies both to carloads and to L. C. L. (merchandise) shipments. As an illustration, the "Maine Meteor" provides overnight service in each direction between Boston and Bangor and other Maine points. Leaving Boston at 6.45 P.M., cars are ready for delivery at Bangor at 5.25 A.M., with connections for Bangor & Aroostook points and Maine Central points east of Bangor. Cars are made up at Boston all ready to go through to Maine Central destinations (formerly cars would not have reached Bangor before 8.30 or 9 A.M.). The "Maine Bullet," leaving Portland at 5.15 P.M., arrives at Harlem River, N. Y., at 5.45 A.M., allowing early morning deliveries at New York points and speeding up service by twenty-four hours. The "Speedwitch" on the New Haven leaves Boston at 5.20 P.M., arriving at Philadelphia at 5.15 A.M. and Baltimore at 8.15 A.M., — another example of "overnight" service not formerly obtainable. Third morning deliveries at Chicago are now provided on shipments from Boston and other points via the three railroads serving Boston, — New Haven, Boston & Maine and Boston & Albany. Such improvements in freight service have enabled shippers to reduce inventories, with corresponding reduction in warehouse and storage facilities and lessened interest charges on stock. By these improvements the railroads have been enabled to hold considerable traffic which might otherwise have been routed over the highways.

The establishment of "store-door delivery" by the railroads (which the author is confident will ultimately be offered) will further strengthen the railroads as agencies of transportation.

It has been the intent to show in this paper the location and physical characteristics of the New England railroads, their interchange with principal connections outside of New England, the character of traffic, and the operating improvements which have been made. In determining what policy should be adopted for the New England railroads with respect to consolidation, due consideration must be given to the fact that the railroads of New England are now in good physical condition, the properties have been modernized, and they are being operated economically and efficiently.

RAILWAY CONSOLIDATION IN NEW ENGLAND

By Charles B. Breed *

(Presented before the Boston Society of Civil Engineers on October 21, 1931, and the New England Street Railway Club on December 29, 1931)

It would be presumptuous for one to venture to appropriately cover this complicated theme in one short address. Railway consolidation has been the subject of study of the Interstate Commerce Commission and of most of the railway presidents of the country for the past decade, with no solution in crystallized form today. During the same period New England has been studying its own railroads. It will be my aim to narrate briefly the progress that has been made in developing a national railroad consolidation plan and to indicate why it is that the consolidation of New England railroads is so peculiar and difficult of solution.

Unless one is familiar with the geography, traffic and recent operating progress of the New England roads, the paper by Prof. J. B. Babcock on "Traffic and Operation of New England Railroads" (published in this issue) should be read in advance of this one.

At the start of our study, let us guard against judging this New England railroad consolidation problem from the premise of the financial strength of any of the New England railroads as of any particular period. Ordinary business consolidations often crystallize at the time when certain companies in the same industry happen to be weak from the credit standpoint. That is a logical and opportune time for such consolidations. The process of manufacturing and selling transportation, namely, the railroad business, is not now governed by the same principles as those controlling the actions of an industrial corporation. This, however, was not always true. In fact, in the early days of railroading and down until the latter eighties a railroad was managed much as any other industry. Its quasi-public character had not been fully appreciated by the public nor respected by its owners. The practice of selling its product as any industry may, at different prices to different purchasers, gave a power to the railroad that spelled ruin to certain industrial corporations, communities and commodities. Discrimination of this nature was curbed by the enactment of laws which,

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* Professor of Railway and Highway Transportation, Massachusetts Institute of Technology, Cambridge, Mass.

at first, merely made such acts unlawful. The first act in 1887 created the Interstate Commerce Commission, but this act lacked the punch later discovered to be necessary. It was followed by such acts as the Elkins Act in 1903, the Hepburn Act of 1906, the Mann-Elkins Act of 1910, the Valuation Act of 1913. Most of these added teeth to the laws of railway control. The World War taught the public and the railroad many valuable lessons, and out of this and past experiences came the Transportation Act of 1920.

Between 1900 and 1920 the regulatory control through legislation had not always been wisely conceived and had therefore not been altogether satisfactory. It was the hope that the 1920 Act would be so successful as to indicate clearly at least that Federal control and not Federal ownership should be the ultimate program for the rail carriers of this country. The 1920 Act was pretty frankly accepted as a masterful legislative product which contained the essentials for a complete and workable plan of Federal control.

The Act terminated Federal control (the war measure), and in addition to many other things it directed the Commission to fix fair rates, to require the stronger roads of a consolidation group to aid the weaker roads, to loan funds to weak roads, to create a plan of consolidation of all the roads into a limited number of systems forming as a whole a national system, and to exercise certain control over the wages and working conditions of railway employees.

It contains three far-reaching clauses which have been the subject of much difference of opinion and discussion, namely, the Rate Making Clause, the Recapture Clause, and the Consolidation Clause. The Rate Making Clause required that the Commission shall determine the rate of net earnings on fair value of the properties and designated that this rate for the next two years, beginning March 1, 1920, should be at least 5½ per cent, plus ½ per cent for betterments and improvements. The Recapture Clause required that the income in excess of fair returns shall be held by the railroad as trustee for the Federal government. One-half of excess earnings above 6 per cent shall be held as a reserve fund, the other half shall go to the railroad contingent fund. Carriers may draw from the reserve fund for dividends in lean years; but the contingent fund shall be used for loans to the weaker carriers. The Commission has tried to enforce this clause but without success. In fact, the Commission has advised Congress that this clause should be repealed. It indicates that a theory that aims to establish as nearly as possible a uniform return for the railroads as a whole or by groups from year to year is unsound, since it necessitates lowering rates in prosperous years (when business can stand the higher rates) and raising them in years of poor business (when business can least afford them). This brief review of these two clauses is given so that the complications that arise in fulfilling the third of these disputed clauses, the Consolidation Clause, may be better understood.

The 1920 Act required the Commission to draft a plan of railroad consolidation on a national scale. These fundamental principles were to guide the Commission, namely, competition should be preserved as fully as possible, existing routes and channels of trade should be maintained wherever practicable, cost of transportation and financial strength as between competitive systems should be equal.

The Act provided that the Commission should first issue a tentative plan, which it did August 3, 1921, after having employed Prof. William Z. Ripley of Harvard University to prepare a comprehensive report on the subject for the Commission. The tentative plan issued by the Commission was a modification of the Ripley report; it formed a basis for hearings which were held throughout the country. Railroads and industries presented many objections. The tentative plan, even in the minds of the Commission, was merely a set of targets (representing nineteen railroad consolidations covering the entire United States) at which anyone had a chance to take a shot, with the result that the targets were pretty thoroughly riddled. Then there came a lull. The Commission had learned a good deal about the difficulties of creating a consolidation plan, made up of a limited number of railway systems, which would be national in scope and also fulfill other quite definite requirements imposed by the Act.

There was much discussion in the press and in railroad circles of the Recapture Clause and the Consolidation Clause, because of the apparent unfairness of the strict application of the former and of the magnitude, delicacy and impracticableness of the latter.

The Commission marked time, waiting for the railroads to make their own propositions for consolidation, for the Act gave the Commission power to approve consolidations. Certain minor consolidations were requested and approved by the Commission, but the larger consolidations, which might properly comprise a part of a national system of consolidation, did not develop. Right here, let us bear in mind that the Consolidation Clause did not give the Commission power to require consolidations. It merely told the Commission to formulate a consolidation plan for the whole country.

In December, 1929, the Commission issued another plan for consolidating all the railroads of the United States, which was called the

Complete Plan, in which it set up twenty-one systems and proposed to hold additional hearings and develop discussion on this new set of systems. Not much progress has been made in this matter; yet there appears to be a very large step forward toward its solution in the so-called Four-Party Trunk Line Plan, which comprises the trunk lines in the Eastern District, and which embodies a substantial portion of the railroad business and capital of the nation. This plan is discussed later.

The New England Railway Consolidation Problem. — Throughout the consideration of consolidation under the Transportation Act, that is, since 1920, the solution of the New England problem has naturally fallen into one of two general classes:

1. The formation of a consolidation of all or most of the New England roads into one group, which for simplicity has been called the New England Group Plan.

2. The Trunk Line Plan, so called, which means that the New England roads shall be parcelled out to one or more of the trunk lines which join the New England roads at their western gateways.

The New England Group Plan virtually treats New England railways as a terminal system. It involves keeping all the gateways open to this terminal system; so that industries located upon any of the New England roads may have not only the privilege of shipping in and out over the routes they select (which privilege the Transportation Act already gives them), but will also be free from any influence which might, as a practical matter, be brought to bear upon them by a trunk line. The Commission states in its 1929 publication of the Complete Plan, as follows:

> We think that consolidations should be accomplished by the unification of all terminal lines in their respective terminals. All terminal properties should be thrown open to all users on fair and equal terms, so that every industry on whatever rails located shall have access to all lines radiating from that terminal, and every line carrier reaching that terminal shall similarly have access to all terminal tracks within the terminal area.

Probably the Commission was referring in the foregoing quotation to smaller terminal districts than the entire New England States would comprise. Nevertheless, it is obvious that, if the New England States are viewed as a terminal system, the statement I have just quoted indicates the thought of the Commission with respect to open trunk line gateways.

Keeping in mind, then, these two general methods of solving the New England consolidation problem, let us see which of these methods have been proposed by the different agencies which have studied the problem.

In Professor Ripley's report on the proposed railroad consolidation plan (1921) he separated the trunk line territory (comprising all the Eastern District north of Virginia except New England) into five systems: 1, Pennsylvania; 2, New York Central; 3, Baltimore & Ohio; 4, Erie, Lehigh Valley & Wabash; 5, Lackawanna, Nickel Plate, Clover Leaf. These systems, of course, also comprised many smaller connecting railroads.

The Commission has apparently felt that the trunk line region required five systems, but the railroads comprising that district have now (1931) proposed four systems, the Four-Party Plan.

Professor Ripley ran along with his study, setting up consolidation groups within five grand regions of the country, and finally found that he had left three small districts which seemed not to fall into any one of the general regions. One of these districts was New England, another the Michigan Peninsula, and the third Florida East Coast Railway; and he made one system of each of these. He proposed a total of twenty-two systems.

With respect to New England, he proposed a New England group, and he dwelt at length upon the difficulties in applying the Consolidation Clause to the New England problem. He discussed the trunk line situation at length, came definitely to the conclusion that no part of the New England system should be connected with the Pennsylvania system, but suggested that possibly it might be connected with some one of the other trunk lines. He left the Boston & Albany, running east and west across New England, as a part of the New York Central system; and he left the Grand Trunk, running north and south across New England, out of his New England plan. Professor Ripley said:

> Many objections to the New England group plan must be met. The first of these is that it runs counter to the express terms of the statute, that "competition shall be preserved as fully as possible." It is contended that this is virtually a plan for regional monopoly, a plan which was expressly rejected by Congress in favor of the creation of a scheme of balanced competition. This contention of illegality may be readily met. The distinction must be drawn between competition within New England and competition of New England with points beyond its confines. It has already been established that any plan other than the group arrangement will substantially lessen competition in service between all the connections west and south outside the New England gateways. Only by the group plan can this existing outside competition be preserved. The legal objection applies, if at all, only to intra-New England competition; and of this there is substantially as much under a group plan as there is at present. For it should be noted that New England is now so parceled out as to railroads that the only com-

petitive areas are along either the line of the Boston & Albany or of the Grand Trunk. At about a dozen places, such as Worcester, Springfield, Holyoke, Lowell, and Nashua, — in other words, along the boundary between the Boston & Maine and the New Haven, — there are three roads in competition with one another. But the group plan proposes no severance of the Boston & Albany from the New York Central. This road will still compete at almost every point, just as effectively with the Boston & Maine and New Haven united as it does with the two of them separately, as at present. And the competition of two roads as fully answers the purpose of the statute as of three. It is submitted as essential that the existing Boston & Albany and Grand Trunk lines should continue to cut east-and-west and north-and-south, clear across the territory; and, of course, all the coastwise points have free competition by water in any event.

With respect to joining the New Haven with the Pennsylvania system, Professor Ripley said:

> The most frequently suggested trunk line plan proposes to incorporate the New Haven road in the Pennsylvania system. The reasons are obvious, consisting of the preponderance of traffic interchanged already mentioned, the close working arrangements, the enormous joint investment in connecting railways at New York, and the interlocking stock ownership. But there are a number of substantial objections to such consolidation. The foremost one is the already preponderating size of the Pennsylvania system as a whole, an objection almost equally applicable to the addition of any other railways to the New York Central group. A prime object in effecting consolidation is to equalize competitive conditions, so that to ally a New England road with systems already so large as to betray evidence of unwieldiness would be entirely contrary to the spirit of the statute. A second objection to the Pennsylvania–New Haven alliance is that the Pennsylvania has no surplus earning power at present with which to upbuild a broken-down New England property, — broken by impairment of its assets through unwise investments in outside properties. But of even greater weight is the undesirability of further congesting transportation conditions in and about New York City. The entire contact of the Pennsylvania is through the Harlem River or metropolitan gateways, and these are routes periodically subject to embargo by reason of overloading. Such congestion might, of course, be remedied by amplification of facilities; but the expense of such improvements through the heart of the metropolitan district becomes more appalling with the passage of time. To set up a prime connection which would throw the traffic of New England inevitably more and more through this gateway seems unwise. And then on top of it all, the absence or any present disposition to consolidate, the Pennsylvania having abundant problems of its own, leads one inevitably to reject this possibility.

Ripley felt that joining the New Haven with the Baltimore & Ohio deserved most serious consideration; but, after mature study, he rejected this also. He fell back on the recommendation that the New England group was the best under all circumstances.

The Interstate Commerce Commission did not adopt Ripley's suggestion with reference to the New England district, as evidenced by its tentative plan issued in the same year (1921) in which the Commission recommended:

1. Joining the Boston & Maine, Maine Central, Bangor & Aroostook, and the Rutland to the New York Central system.

2. Joining the New Haven to the Baltimore & Ohio system.

In making these suggestions, the Commission says: "Professor Ripley rejects the trunk line treatment of the New England roads, but we present this alternative with a view to developing this situation upon hearing."

The Commission also made another tentative suggestion, namely, the consolidation of the New England roads, except the Rutland, with the New York, Ontario & Western and the two small bridge lines, namely, the Lehigh & Hudson River and the Lehigh & New England.

It submitted still another suggestion, called the New England–Great Lakes grouping. This was the same as the one just mentioned, namely, the New England roads joined to the New York, Ontario & Western, and including the two small bridge lines, but added to it was the Delaware & Hudson, the Ulster & Delaware, the Lackawanna, the Buffalo, Rochester & Pittsburgh, and a few other smaller lines.

Obviously the Commission had no preconceived idea of how the New England problem should be solved consistent with the Consolidation Clause, but apparently felt that to fit the Act these roads should be consolidated with some of the trunk lines.

In 1922 the governors of the New England States appointed the Joint New England Railroad Committee to study the New England consolidation problem and report upon it. This committee has been known as the "Storrow Committee" in recognition of its chairman, the late James J. Storrow.

The Storrow Committee made an extensive study of the New England situation and of all the suggestions which had been made for the solution of the consolidation problem in this district up to that time. The committee said that the Interstate Commerce Commission plainly had difficulty in interpreting the Transportation Act with reference to the consolidation of the New England roads. The Act required a set-up of a limited number of systems comprising the national system. In each system there should be combined the financially weak with the financially strong roads, so that when the consolidations had been accomplished we should have systems which could bear with substantial equality the enforcement of uniform rates contemplated by the Transportation Act without wrecking any large part of our railroad mileage and without at the same time unduly enriching the strong roads.

I would again remind you that throughout this discussion it is well to ask ourselves continually, When is a road financially strong and when is a road weak? It is well known that certain roads have been strong and certain roads have been weak from their inception because of the favorable or unfavorable location chosen by their projectors. It is also equally well known that certain well-located railways have become lamentably weak through mismanagement, and the New Haven and the Boston & Maine plainly fall in this latter group. Hence it is apparent that, in the study of the railway consolidation problem, one must really ask the question, Is the railway inherently strong or inherently weak, or is its present strength or its present weakness an incident in its managerial history? This point is the one which I think has not been properly evaluated by certain authorities who have studied at length and expressed their views upon the New England railway consolidation problem. It is interesting to note as we proceed how the then existing financial condition of the New England roads influenced opinions on consolidation.

The Storrow Committee in conclusion stated:

> The committee is satisfied that such a compact railway system as that represented in the proposed New England consolidation would involve a minimum of the evils and, with conditions as they are in New England, would produce a maximum of the benefits possible to result from consolidation under the provisions of the Transportation Act of 1920.
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> But the committee believes that such consolidation is neither advisable nor equitably possible until each of the two major New England systems shall first have been rehabilitated and shall have shown the financial and operating results it is capable of producing under normal conditions and with restored credit.

It is obvious that the two major systems referred to in the Storrow report, namely, the Boston & Maine and the New Haven, have been rehabilitated since 1923 in a most astonishing manner; and one can properly draw the conclusion, therefore, that the Storrow Committee, could it have foreseen what was to happen, would have definitely favored a New England group.

While the Storrow Committee was studying this problem, it requested the Affiliated Technical Societies of Boston to appoint a committee also to make a study of the problem. This committee was comprised of Prof. George F. Swain, chairman, Charles T. Main, Charles R. Gow, Eugene C. Hultman, Prof. Dugald C. Jackson and Leonard Metcalf. That committee reported in favor of a trunk line plan. It substantially adopted the recommendations of John E. Oldham, who had published several articles advocating trunk line consolidation of the New England railroads. In its report the committee laid great stress upon the financial weakness of the New Haven and of the Boston

& Maine and upon the fact that the portion of through rates which was paid to the New England roads was not sufficient to ever permit the rehabilitation of the New England railroads or to establish their credit. It stated that certainly no plan for consolidation should be permanently adopted which would depend for its success upon such a hope of rehabilitation. The report reads:

> It is easy to state what they want, namely, good service, reasonable rates, the preservation of the gateways to New England, the retention of the Canadian differential, and the privilege of shippers to route their shipments as they desire. The question, however, is not what New England wants: the question is what, under the circumstances, can New England reasonably expect to get. . . .

It is pretty plain that this committee of the Affiliated Technical Societies of Boston started with the premise that the Boston & Maine and the New Haven could never "come back," and also with the assumption that the Interstate Commerce Commission would never adopt the New England Group Plan. As a matter of fact, the portion of the trunk line revenue which the New England railroads received was increased the following year by the Interstate Commerce Commission; and another all comprising change later occurred, namely, the complete rehabilitation of both these systems and the re-establishment of their credit largely through the introduction of capital raised in New England. This report of the engineers' committee is another evidence of the imprudence of drawing conclusions relative to consolidation when one measures the strength and weakness of a railroad system by the facts as they exist at that particular period. The approach should plainly be on the premise of the potential or fundamental strength or weakness of the systems and the reasonable prediction of changes in revenue through alteration of distribution of trunk line revenue, through the alteration of rates in general and through competitive transportation agencies.

Mr. E. C. Hultman, now Police Commissioner of Boston, who was a member of the committee of the Affiliated Technical Societies, dissented from the opinion of the majority. He favored a consolidation of the New England railroads into one group, as did the Storrow Committee. One prophetic statement stands out in his minority report, which reads as follows: "The claim that the New England railroads are fundamentally weak financially is unsound." Apparently his opinion and vision were correct. He goes on to say: "What the New England railroads are suffering from is the temporary loss of earning power due in large part to an insufficient return from through rates." A larger share in through rates was granted the following year.

From 1923 to the present time the railroads of the entire country have given a great deal of consideration to voluntary consolidations. They have worked more and more in co-operation with each other and have been encouraged to do so by the Interstate Commerce Commission, which has practically dropped any aggressive pressing of a consolidation plan.

The next important suggestion came in the form of the Complete Plan in 1929, proposed by the Commission. This plan comprised all the roads of the country, and it suggested for New England two systems, — System No. 1, Boston & Maine, and System No. 2, New Haven.

System No. 1 was to comprise the Boston & Maine, Delaware & Hudson, Bangor & Aroostook, Maine Central, Rutland, and many small connecting roads. System No. 2 joined the New Haven with the New York, Ontario & Western and with the two bridge lines, the Lehigh & Hudson and the Lehigh & New England. The Commission left the Boston & Albany as part of the New York Central system.

Notice, if you will, that in its tentative plan of 1921 and also in its so-called Complete Plan of 1929 the Commission did not adopt the Ripley suggestion of a New England group nor the Storrow Committee's suggestion of a New England group, but in both instances suggested that the two large New England roads, namely, the Boston & Maine and the New Haven, be joined to a trunk line, but in neither case was that trunk line the Pennsylvania Railroad.

Joining any part of the New England system with the Pennsylvania Railroad has not yet been suggested by the Commission in any of its plans, nor has it been suggested by the New England governors' railroad committees, — either by the Storrow Committee or by the 1930 railroad committee of the governors of the New England States.

I mention particularly the Pennsylvania Railroad because its rapid acquisition of 22 per cent of New Haven voting stock, together with an even more rapid acquisition of 44 per cent of Boston & Maine stock by the New Haven (through the Boston Railroad Holding Corporation) and the Pennroad Corporation, was the warning signal which led the New England governors to appoint in 1930 a committee, called the New England Railroad Committee, to again study the New England railroad consolidation problem. This committee reported to the governors in 1931 after an intensive study of over a year. The committee comprised thirty members, five appointed by each of the six governors of the New England States. It held many hearings, at which Professor Ripley, Mr. Oldham, Judge George W. Anderson, formerly a member of the Interstate Commerce Commission, the presidents of the trunk lines and of New England railroads, and many influential bankers and manufacturers interested in New England industries, presented their views. Special phases of the subject were studied by experts, who reported to the committee.

A considerable portion of the committee's report related to the concern felt because of the holdings of the Pennsylvania Railroad and the Pennroad Corporation of New Haven stock, and the large holdings of the Pennroad Corporation and the Boston Railroad Holding Corporation (which is controlled by the New Haven) of Boston & Maine stock. In fact, the fear of the Pennsylvania's direct and indirect influence in New England railroads dominates the report.

The report states that the various consolidation plans considered for New England were from the following standpoints:

(*a*) Possibility of increase in traffic and in gross revenue.

(*b*) Tendency to reduce cost of transportation, including operating economies.

(*c*) Improvement in freight and passenger service.

(*d*) Development of shipping through New England ports, coastwise, intercoastal and foreign.

(*e*) Protection of present competitive position of New England industry in trade and the prospective future development of industrial New England.

Among the essentials of a transportation policy for New England, the committee stressed the following: service, rates, management, credit, port development, Canadian differentials, gateways, co-operation between railroads and industry, competition between trunk lines, co-ordination between railroad and motor transport, including pick-up and store-door delivery.

Obviously the committee viewed the problem from the standpoint of New England's best interests as it interpreted them. Its function was not to solve the problem for the Interstate Commerce Commission, but rather to present its own case with due consideration as well to the fulfillment of the intent of the Consolidation Clause of the Transportation Act and to the prosperity of the country as a whole, for if New England prospers it is an asset to the entire country.

This 1930 committee pointed out that New England industry and trade has a keen realization of the necessity for keeping open all gateways, so that its shippers may have the greatest possible freedom of choice as between the water routes, the Hudson River gateways, and the northern, Canadian, gateways. Only by such a policy can there be at all times and under all conditions the freest possible access for

New England to the rest of the country. Keeping all the gateways open and in use means the strengthening of the bonds between New England and the rest of the country.

To those who point to New England as provincial and as having "gone to seed," one can refer with pride to the achievement in the rehabilitations of the two large railway systems, which, from a condition approaching bankruptcy with service badly crippled, were in an incredibly short time turned into properties with restored earning power, with good credit and with excellent service. "This," says the 1931 report, "is a deed of the first magnitude, and the management deserves the respect and gratitude of the New England people for the courage with which they faced this difficult task and for their skill and ability in working it out with such remarkable success. The improvement was accomplished under management controlled by New England men and was financed largely with New England capital."

In 1929 New England railroad investment was about a billion dollars, the gross revenues $300,000,000, operating expenses $220,000,000, amount available for dividends, after fixed charges, $36,000,000, contrasted with a deficit of $650,000 in 1922, and all this in the face of a passenger revenue decline from $91,000,000 in 1922 to $78,000,000 in 1929.

With reference to the magnitude of railroad traffic in and out of New England, the report makes the interesting statement that the New England roads had a gross income in 1929 which was about equal to the combined income of the Union Pacific and the Northern Pacific railroads. In amount of gross revenue the New Haven is among the first fifteen roads of the country. It is no discredit to the trunk lines that they desire this dependable volume of traffic to and from a seasoned and diversified manufacturing district.

The committee clearly feared the power possessed by the Pennsylvania. No particular overt act was apprehended, and possibly some even felt a confidence in the present Pennsylvania management, yet what future managements may do was disconcerting. New England has had good reason to be sensitive on the subject of who will manage her roads. In addition, the committee had in its files a statement by E. J. Pearson, former president of the New Haven, which reads:

> Assuming consolidation between the New Haven and a trunk line, this would inevitably result in an attempt to control the movement of traffic and restrict it as against other gateways and other routes.
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> Privileges of shippers, heretofore enjoyed freely, would become restricted in part by the provisions of the Interstate Commerce Act, permitting a system to refuse to

> short haul itself, and, in addition, shippers would gradually find themselves under new influences. The tendencies could not be other than restrictive, in the desire to secure all of the traffic possible for the consolidated system.
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> Inflexibility would gradually come about in respect to rates, divisions, etc., other than those confined to the consolidated system. The use by New England of any and all routes, water as well as rail, would almost surely suffer restriction instead of encouragement as now.
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> It has been assumed that, with respect to the New England section of a consolidated system, it could be placed under the requirement to continue to serve the public in all matters as heretofore.
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> If this is the case, it is apparently the thought that the trunk lines which consolidated with the New England system would forego certain advantages and rights but would assume the financial obligation. Is this reasonable? Should a trunk line, for example, merge with the New Haven, is it conceivable that terminal service for the other trunk lines would thereafter receive the same treatment as now? Does the history of railroads bear evidence of such instances of altruism? Is this contemplated by the Transportation Act? (Docket 12964, pp. 8141–8145.)

Though control may not be exercised, the Pennsylvania is, nevertheless, already in a position to dictate the policy of the two big New England roads. While this situation exists the New England governors believe that the consolidation of the roads in the Eastern District outside of New England, such as the Four-Party Plan, as well as the consolidation within New England, should be carefully watched.

The Four-Party Plan comprises 60,000 miles, or one-quarter of the total mileage of the United States. This trunk line territory contains half of the population and wealth of the country and produces half of the total rail transportation in ton miles and passenger miles, and its property investments are about ten billions of dollars, or 40 per cent of all the railroads in the country. These plainly indicate the magnitude of the four-party agreement. These four consolidations are headed by: 1, Pennsylvania; 2, Baltimore & Ohio; 3, New York Central; 4, Chesapeake & Ohio-Nickel Plate (the Van Sweringen system). And all four systems terminate on the west side of the Hudson River, leaving New England isolated.

The majority of the New England Railroad Committee recommended in 1931:

1. That the governors petition the Commission for a right to intervene in the Four-Party Plan proceedings.

2. That the governors ask the Boston & Maine and New Haven to co-operate in working out an arrangement which will make it possible for the Boston & Maine and New Haven to formulate a plan for the consolidation of these two roads and to submit it to the Commission while the Four-Party Plan is before that Commission. And that New

England should now, and until the Pennsylvania's present ownership in New Haven stock has been substantially reduced to the satisfaction of the governors, oppose any proposal for consolidation of the Boston & Maine and the New Haven. The committee recommended that legal proceedings against the Pennsylvania should be avoided if possible; that the Pennsylvania and Pennroad corporations should give up holdings in the Boston & Maine and New Haven in excess of 10 per cent of the total voting stock.

3. If the Pennsylvania holdings will not be given up by negotiations, the committee recommended that the governors institute legal proceedings to seek termination of such holdings through the courts.

4. If the Pennsylvania cannot be divested of its holdings of these railroad stocks through negotiations or through law, that the governors request the Commission, should the Four-Party Plan meet their approval, to stipulate as a condition of its approval that the Pennsylvania shall divest itself of its excess ownership in the Boston & Maine and New Haven; for, if it does not, the Pennsylvania will be so large and powerful a trunk line as to throw out of balance the parity of competitive opportunity which was contemplated by the Four-Party Plan and the Transportation Act.

5. That, as part of the Four-Party Plan and of the consolidation of the Boston & Maine and New Haven, the Commission be requested to impose in its order of approval a condition that no railroad, directly or indirectly, shall acquire stock in the New England roads without the approval of the Commission.

6. It recommended to the governors that they urge the New England members of Congress to support legislation providing for regulation by the Commission of the activities of holding companies in acquiring stocks of other railroads.

The committee reported in favor of the consolidation of the Boston & Maine and New Haven, and made no allocation of the other New England railroads. It advised definitely against any trunk line consolidation and did not favor even the Boston & Maine and New Haven consolidation until the Pennsylvania control of the stock of these two roads is broken.

The Pennsylvania has stated that it does not propose to give up any of its holdings in these two roads and has indicated that it will fight any legal measures leading to this end. The extensive purchase of New Haven stock by the Pennsylvania does not appear to be other than a sagacious business operation on the part of that road; for it seems probable that whatever the Commission's decision may be, the net result will be a favorable return to the Pennsylvania on the investment it has made in the New Haven.

The Rhode Island members of the governors' committee dissented from the majority report. Messrs. Richards and Jones, both of the Massachusetts group of the committee, favored the general recommendations of the committee but disagreed with the committee with reference to its attitude toward the Pennsylvania, taking the position that the holdings of the Pennsylvania in these two New England roads are not excessive and that the effort to reduce it by threat of coercion would be distinctly injurious to New England railroad securities.

The Rhode Island contingent of the committee went along with the majority in recommending leaving the New York Central in control of the Boston & Albany; but in its dissent from the opinion of the majority it recommended that the New Haven be amalgamated with the Pennsylvania, and that the Boston & Maine be joined to the Chesapeake & Ohio–Nickel Plate (the Van Sweringen system), and certain other minor modifications.

The New England Council, which represents New England industries, was the prime mover in getting the governors to appoint this committee of 1930. After their report was made, the New England Council requested the Engineering Societies of Boston and the Boston Society of Civil Engineers (the largest single group of the Engineering Societies of Boston) to study the New England Railroad Committee's report and transmit its conclusions to the New England Council. The same personnel was appointed by both the Engineering Societies of Boston and by the Boston Society of Civil Engineers. This Engineers' Committee comprised J. P. Alexander, Professor C. Frank Allen, Frank M. Gunby, Lewis E. Moore, Frank B. Walker and the writer.

Our Committee indorsed the report of the majority of the New England Railroad Committee, although I think it is fair to say that we did not individually agree with all of it. The matters in which we did agree were based upon certain fundamental reasons, which led us to the same conclusion. We agreed that this problem should not be viewed with respect to the immediate financial condition of the railroads involved, be they favorable or unfavorable, although it was felt that the two major systems, the New Haven and the Boston & Maine, serve industrial districts which are so fundamentally prosperous as to insure to these roads dependable traffic. There have been revolutionary changes in railway operation in the past five or ten years which could not reasonably have been predicted twenty years ago. There will doubtless be great changes in railway transportation and in highway transportation which will develop in the next decade. It was feared that consolidation as suggested by the trunk line advocates can only result in restricting the present routing of freight and in reducing the present number of routes available to our shippers. The trunk line consolidation would as a practical matter deprive New England of the full freedom of alternate routes, which the shippers now enjoy when they reach the Hudson River. This routing privilege would be fully retained under a New England Group system. New England should retain control of its railroads, not only because it has the financial ability to do so, but because it is more dependent upon transportation than almost any other part of the country. And, for this latter reason, also, it should cautiously determine its railroad consolidation policy.

These are uncertain times so far as the railroad business is concerned, not merely due to the present business conditions but due to the tremendous development in highway traffic and the competition it is affording, particularly to railroads with short haul. It is distinctly the time when one should not predict with too much fervor that this railroad or that railroad, though it may be strong today, will be recognized as a strong system a generation from now. If the New England roads are consolidated with trunk lines, a business consolidation will then exist which it will be practically impossible to abrogate. If, on the other hand, New England lines are grouped for the present into a New England consolidated system and if this plan should prove unsuccessful, it will still be possible to consider consolidation with one or more of the trunk lines. In short, while the Committee of the Engineering Societies could not go along with all of the reasoning and conclusions of the New England Railroad Committee, it felt that approval of that committee's report was the safest position for New England to take at the present time.

Other committees have studied the New England problem at the request of the New England Council. A committee of the Savings Bank Association of Massachusetts recommended leaving the Boston & Albany to the New York Central, giving the New Haven to the Pennsylvania, separating the Boston & Maine from Pennsylvania influence and allocating it to some trunk line, which will give the Pennsylvania real competition. This means to give the Boston & Maine to the Van Sweringen systems. The bankers' committee also indicated that the Baltimore & Ohio should have some consolidation with New England, but on the latter point no specific suggestion was made. The Savings Bank Committee has no fear of the Pennsylvania control so long as it is confined to the New Haven.

Railroad transportation is destined for some time to come to be the natural and economical method for the long haul. There appears on the horizon of scientific progress no transportation agency that will soon upset this conclusion. If public opinion will direct legislation toward appropriately controlling interstate highway transportation, it will go a long way toward clarifying the present unfair and unsatisfactory competitive conditions that exist between these two transportation agencies.

For short hauls, of say 100 miles, the motor transport presents attractive characteristics for the transportation of those manufactured goods which carry a relatively high railroad freight classification. Raw materials, of course, will continue to be carried in bulk into New England by rail and water. The tons of raw material coming into New England, including as it does coal and oil, greatly exceed the tons of manufactured material; but, since the latter carries much higher rates, it presents an attractive outgoing traffic for the railroads, which they naturally desire to keep. When these manufactured materials are destined for distant points, the railroads will readily retain this traffic; but when destined for consignees a relatively short distance away, motor transport will doubtless present a serious competition to the railroads and should in fairness be regulated in accordance with the general principles which control the railroads. The solution of this problem of competition between highways and railroads will not solve the New England consolidation problem, but will clarify it. One must bear in mind the fact that the railroads of New England are short lines and have therefore been especially affected by the development of motor transport. New England, more than any other part of the country, needs co-ordination and co-operation between the railroads and highways. It requires the service of both, and it needs determination of a proper control of each agency; so that the transportation job that one can perform more economically and better than the other shall, through the exercise of simple economic laws, logically fall to the proper transportation agency.

The urgency of immediately developing a consolidation plan for the entire country (including New England) does not exist. Eleven years have passed since the law was enacted. So many and vital changes have occurred in railway and highway transportation during that period that one hesitates to be too positive in his estimate of the future. Consolidation of railroads may be far reaching in its effect. It should not be entered into too hastily. Time and experience will teach us much about its solution. With respect to New England it is wise to adopt the view of the Interstate Commerce Commission expressed by its chairman to the Senate Committee in 1926, when he said:

> Our judgment is that the country ought not to be rushed headlong into any gigantic plan of consolidation which may prove later to be ill-conceived and based upon mistaken premises, but that it ought instead to proceed cautiously without any undue anticipation of possible beneficial results, feeling its way along step by step, watching and analyzing results, and allowing experience to guide.

Discussion

John S. Lawrence, Treasurer and first President of the New England Council, and one of the Massachusetts members of the New England Railroad Committee, described the work of that committee. He stated that after nearly two years of study of the subject he was convinced of the justice of the position he had taken in supporting the majority report. He said: "I believe that New England can have whatever she really wants," and he stated that he and the other signers of the majority report were of the opinion that no interests would desire to run a railroad in any territory against public opinion. The difficulty throughout had been to determine a policy on which New England interests were reasonably united. He gave a very fair presentation of the reasons which led some of the other members of the committee to bring in minority reports. At the conclusion of his remarks Mr. Lawrence answered a number of questions relative to the conditions and recommendations of the committee.

J. P. Snow (by letter):* The consolidation of the Boston and Maine and New Haven railroads as approved by the report before us is probably the best move that can be made in the railroad game at present. It is merely a little step in the right direction. It cannot produce great results in itself, but it may discourage undesirable moves which would make a final solution difficult.

The exhibits of traffic data by Mr. Babcock showed the vital necessity of keeping the Canadian connections freely open to the west-bound traffic of New England. The marine gateways along the coast are equally important. Eventually the three roads entering Boston, if no other of the New England roads, should unite in a single corporation, so that all trunk lines, American and Canadian, as well as water routes may bid for our shipments.

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* Consulting Engineer, Boston, Mass.

The suggested consolidation of the three Boston roads is a prime essential also of a proper development of an efficient railroad terminal here, which, in its turn, is vitally necessary to the growth of our seaport. After unified ownership, the next prime essential needed by a railroad terminal is a proper belt line, which at most large cities is impracticable on account of great cost. Here, fortunately, a line is already built and owned by railroads, but it has never been coupled up to function as a belt line. I refer to the Grand Junction line from East Boston to Allston, continuing on the Boston & Albany main line to Riverside, thence through Newton Highlands, the Needhams, Dedham, Readville, South Bay and on to the South Boston piers.

The recommendations of the Committee favor a step toward this desideratum.

REPORT OF COMMITTEE ON RESEARCH, BOSTON SOCIETY OF CIVIL ENGINEERS

NOTE. — At the urgent request of the President, Mr. Harry E. Sawtell, who stated that valuable data could be assembled from the experience and activities of the Engi-eers which could be considered in the nature of research, the Board of Government uthorized the appointment of a committee to investigate the possibilities and to outline subjects or fields in which research is possible for many individuals of the Society, without entering the field of costly laboratory research. The Committee on Research, appointed by the President, has made its report, which is given below. It is desired that our members give consideration to this report, offer suggestions on this matter, and, if possible, undertake some of the items outlined in the report. The Committee on Research is a continuing committee, and all communications should be addressed to that committee, at 715 Tremont Temple, Boston, Mass. — EDITOR.

JANUARY 27, 1932.

Board of Government, Boston Society of Civil Engineers, Boston, Mass.

GENTLEMEN: — The committee appointed to study and report upon subjects for research has enlisted the aid of other members of the Society, representing various lines of engineering work, with the result that a collection of subjects has been made, which is submitted herewith.

This list is by no means complete and can only be considered as suggestive. To any one reading this list, other subjects of equal or even greater value will doubtless be brought to mind. These subjects are ntended not so much for research involving elaborate apparatus or considerable expense, but for work by small groups of engineers or even by individuals. Observations based on actual practice, simple tests which can be made without undue expense, and the searches in literature may be utilized in the preparation of brief reports and papers along the lines indicated. Certain subjects are collective and could be subdivided into several sections, each worthy of independent study.

Some of the subjects may suggest valuable lines of research that can be carried on only by large organizations or by well-equipped technical laboratories, but such is not the primary object of this report.

Papers involving considerable search through the literature should have a bibliography appended.

We recommend that this report be published in the JOURNAL of the Society and that discussion be invited with the expectation that other subjects will be suggested, which may be fruitful sources of papers and committee reports.

Respectfully submitted,

FRANK A. MARSTON, *Chairman.*
HAROLD K. BARROWS.
MILES N. CLAIR.
A. B. EDWARDS.
ERWIN HARSCH.
FRANCIS H. KINGSBURY.
RALPH E. RICE.
FRANK B. WALKER.

SUBJECTS FOR RESEARCH

Engineering, General

1. Design and experience with waterfront structures, such as walls, wharves, piers, etc., over a period of years. Types of structures.
2. Opportunities in the various fields of engineering, with particular reference to suggestions helpful to young engineers as to proper fields to enter.
3. Experiences in placing pipe in the ground by jacking.
4. Prophesying future populations for public utility, traffic estimates, etc.
5. Statistical information from 1930 census. Relation of population, assessed valuations and other items to data of engineering interest.
6. Co-ordinating underground work in cities to avoid unnecessary breaking of pavement. Allocation of underground street space to utilities, etc.
7. Cutting metals by the flame torch and application of the same to engineering structures. Machine cutting for grille work, ornamental ironwork, etc.
8. Experiences and costs in welding pipe for gas mains; oil lines, etc.
9. Structural welding methods; relative values of joints compared to rivets; actual cost; inspection. Observations from structures taken down.
10. Observations on actual pressure of ground water on floors of basements, bottoms of tanks and other structures of considerable area; design of structures to resist ground water pressure and to prevent uplift.
11. Observations on actual wind pressures on windows, skylights, doors, etc.
12. Subsidence of filled land; fills made by hydraulic dredging, dumping refuse, etc. Effect on street grades, etc.
13. Records of settlements of land and buildings in the Boston area.
14. The design, construction and maintenance of small timber dams.
15. The design, construction and maintenance of timber bulkheads and cofferdams.
16. Deep excavations and effect on utility structures in adjacent streets.
17. The design, construction, inspection and maintenance of timber bridges.

Separation of highway grades in congested areas; double deck sidewalks; arcades. Traffic circles; overpasses.

Problems in smoke abatement of interest to engineers.

Problems in noise abatement.

A building code for small cities.

Restricting bidders on construction work by specifying qualifications.

Suggestions for improving engineers' standing in the community. Public relations.

Changes or developments in the management of enterprises of interest to engineers.

Engineering work required in the construction of a steel frame office building; methods and "kinks."

Index to JOURNAL of the Boston Society of Civil Engineers and papers of particular value in the Journal of the Association of Engineering Societies during the period when the Boston Society of Civil Engineers was a member of that association.

Materials of Construction

New metals and their engineering uses.

Advances in the art of manufacture, new materials or new processes of particular interest to engineers.

Recent developments in methods of treating metals of service to engineers.

Abrasion resisting materials; treads, flooring, chute linings, etc.

Brickwork; character of materials and laying, water resistance. Reinforced brickwork.

Effect of long-time agitation on concrete as occurs in ready-mixed concrete, with particular reference to durability and volume changes in concrete.

Durability of modern cements; observations on effect of high early strength cements; on structures after several years' life; tests for determining durability.

Design of concrete structures, particularly dams, with reference to allowances for volume changes due to setting of concrete and temperature changes.

Characteristics of light weight concrete; strength, thermal conductivity, acoustical properties.

Malleable cast-iron, treatment, value and characteristics.

Wrought iron for engineering structures.

Effect of steady changes of temperature on steel.

Experiences in the examination of old iron and steel structures, as for strength.

Observations on condition of structural steel members in buildings after years of use. Data obtained when repairs are made or buildings torn down.

Protection of steel against rust. Painting, chemical methods, etc.

Structural steel alloys and their uses. Non-rusting, etc.

Grading of timber by government or national authorities; by local dealers; local interpretations.

Treatment of timber for fire resistance, rot resistance, etc.; shrinkage of timber.

Experiences in the examination of old wooden structures, as for strength.

Waterproofing materials; actual composition. Amount of penetration or saturation as in the case of felts. Definite information and experience. Chemical and electrolytic action in mastics and membranes.

Waterproofing materials and methods for the protection of concrete, brick and other masonry surfaces; damp-proofing; frost-proofing.

Waterproofing deep basements.

Fire resistance of various types of construction and materials.

Soil Mechanics

50. Records of difficult conditions encountered in underground construction and how they were overcome.
51. Engineering data relating to failure of earthwork; earth slides, etc.
52. Records of pile driving. The Society might well make a collection of such data relating to all piles driven in the Boston Metropolitan District.
53. Engineering data relating to the settlement of buildings.

Soil Physics

54. Records of experiments; physical properties of soils.
55. Observations on earth pressures. Actual examples with engineering data on failures of trench sheeting, tunnel timbering, etc.
56. Lines of saturation in earth dams, embankments and fills.

Water Power

57. Records of actual flow at power plants.
58. Methods of handling frazil ice at power plants.

Stream Flow

59. Effect of storage on flow of rivers expressed in terms of mean flow.
60. Collection and tabulation of flow data and runoff factors for small streams.
61. Effect of climate on maximum runoff of rivers. Comparison of southern rivers with northern.
62. Determination of railway and highway culvert openings. Review of formulæ, etc.

Hydraulics

63. Summary of recent tests of carrying capacity in water mains of various kinds and under various conditions.
64. Loss of head in junction chambers. Study of losses of head which occur when two streams of water join or a single stream is divided.
65. Loss of head in pipe tees.
66. Values of "n" in Kutter formula for open channels or pipes flowing partly full where water surface is in contact with air.
67. The time element involved in the movement of large volumes of water; rate of travel of flood waves; effect on river regulation, etc.
68. Coefficients of discharge for sluice gates, gate valves and other special types of gates.
69. Coefficients of flow over dams under high heads, 8 feet to 10 feet or more.
70. Loss of head through racks, bar screens, etc.
71. Loss of head through fine screens.
72. Loss of head in mixing basins, fishways and similar structures.

Garbage and Refuse

73. Composition of municipal refuse; actual mechanical analyses from typical districts over a period of months; calorific value of various materials; effect of wet weather.

Sewerage

. Observation on the diffusion of sewage from various types of submerged outlets.

. The ability of the waters of Boston Harbor to receive the discharge of increasing amounts of sewage.

6. Grease traps for hotels, restaurants, etc., to protect sewers.

7. Oil and gasoline traps for garages, to protect sewers.

8. Design of roof drain conductors. Observations on rate of runoff from roofs of various types.

9. Time required for storm water to reach inlets. Actual observations.

0. Abuse of separate systems of sewerage; of storm drains; and resulting contamination of basins and beaches.

Waterworks

1. Yield of small drainage areas for water supply.

2. Yield of ground water supplies; quantity and quality of water.

3. Yearly use of storage reservoirs with reference to volume of reservoirs.

4. Runoff from melting snow. Water equivalent of snow.

5. Investigation of rainfall cycles as affecting the design and operation of hydroelectric plants, water supplies, etc.

6. Records of precipitation at high altitudes in New England and elsewhere.

7. Records of actual demands on waterworks during large fires.

8. Records of actual reduction in insurance premiums, resulting from improvements in waterworks.

9. Examples of improvements in fire protection of interest to engineers.

0. Wire drawing in partially closed valves in water mains. Experiences with wear in valves of various types used to throttle the flow of water.

1. Merits and economics of various kinds of water pipe now available.

2. Modern waterworks pumping machinery.

3. Types of reservoir linings. Experiences in construction and operation.

Valuation, Financial

4. Valuation of public utilities; actual records of abandoned structures; records of observed depreciation; records of small pipe replaced by larger in waterworks systems, etc.

5. Methods of estimated accrued depreciation of various public utility structures.

6. Changes or developments in the financial world of interest to engineers.

7. Engineers' status in the field of promotion; passing on bond issues; plans for financing; construction programs.

OF GENERAL INTEREST

SPECIAL COMMITTEES OF THE BOSTON SOCIETY OF CIVIL ENGINEERS

The following Special Committees have been authorized by the Board of Government, in addition to the committees listed on inside of back cover:

Relation of Sections to Main Society

JOHN B. BABCOCK, 3d, *Chairman*

RALPH W. HORNE
HAROLD K. BARROWS
ERWIN HARSCH
ARTHUR W. DEAN
FRANCIS H. KINGSBURY
A. B. EDWARDS
JOHN B. KOMICH

Registration and Licensing of Engineers

FRANK A. MARSTON, *Chairman*

FRANK E. WINSOR
CHARLES B. BREED

Research

FRANK A. MARSTON, *Chairman*

HAROLD K. BARROWS
MILES N. CLAIR
A. B. EDWARDS
ERWIN HARSCH
FRANCIS H. KINGSBURY
RALPH E. RICE
FRANK B. WALKER

Run-Off

ARTHUR T. SAFFORD, *Chairman*

ARTHUR C. EATON
X. HENRY GOODNOUGH
WILLIAM D. HENDERSON
S. STANLEY KENT
H. B. KINNISON
WILLIAM A. LIDDELL
ARTHUR D. WESTON
R. R. MARSDEN
WILLIAM NOYES
L. B. PUFFER
CALEB MILLS SAVILLE
HOWARD M. TURNER
WILLIAM F. UHL
FRANK E. WINSOR

Welfare

Ralph W. Horne, *Chairman*

A. B. Edwards
Erwin Harsch
Everett N. Hutchins
Francis H. Kingsbury

AWARDS COMMITTEES

Desmond FitzGerald Award

Frank B. Walker, *Chairman*

Charles R. Main
Harold K. Barrows

Sanitary Section Award

Harold K. Barrows, *Chairman*

Richard S. Holmgren
Harry P. Burden

Designers' Section Award

Charles R. Main, *Chairman*

W. W. Bigelow
Charles Tirrell

PROCEEDINGS OF THE SOCIETY

MINUTES OF MEETINGS

Boston Society of Civil Engineers

January 27, 1932. — The regular meeting of the Boston Society of Civil Engineers was held this evening in Chipman Hall, Tremont Temple, and was called to order at 7 p.m. by the President, Harry E. Sawtell. About 95 members and guests were present. The usual buffet supper was served to 70 people.

Announcement was made of the death of Thomas F. Bowes, who died on January 24, 1932, and who had been a member since May 15, 1907.

The Secretary announced the following new members elected to membership by the Board of Government:

Grade of Member: George Fred Brousseau,* F. Tyler Carlton,* John Henry Harding,* Edward Charles Roche.

Grade of Junior: Francis Joseph Alves, Ernest P. Demers, Francis W. Di Carlo, Louis Feldman, Israel Gold, Harry Robert Hamilton, Everett Hinckley, Gerald T. Pillsbury, Lorrin M. Pittendreigh, Eugene J. Rapoport.

The President, speaking of the welfare work, stated that this work started by the Boston Society of Civil Engineers has been enlarged in scope and is now being carried on by the Engineering Societies of Boston jointly with the Architects Society, under the name of the Emergency Planning and Research Bureau, Inc., and urged all those who had not yet contributed to send in their pledges at once.

Attention was also called to the forthcoming dinner of the Engineering Societies of Boston, to be held on February 9, 1932, at the Copley Plaza Hotel.

The President then introduced the speaker of the evening, Mr. Harry E.

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* Transfer from Grade of Junior.

Popp, mechanical engineer with the New England Power Engineering and Service Corporation, Boston, Mass. A very interesting paper was presented on "The Mechanical and Hydraulic Features of the McIndoes Falls Hydro-Electric Development of the Grafton Power Company," a part of the New England Power Association. This plant, which is located at McIndoes Falls, Vt., consists of four units, each of 3,300 K. V. A. capacity. Two of the turbines are of the automatic, adjustable-blade, Kaplan type, the other two being the more conventional fixed-blade type. Particular emphasis was laid on the operating characteristics and design of the adjustable-blade turbines. The paper was illustrated by lantern slides.

A number took part in the discussion, including Howard M. Turner, Prof. H. K. Barrows, Theodore B. Parker, H. B. Kinnison, E. A. Dow, William D. Henderson, J. B. Drisko and William F. Uhl.

A rising vote of thanks was extended to the speaker for his interesting paper.

The meeting adjourned at 8.45 P.M.

EVERETT N. HUTCHINS, *Secretary.*

Sanitary Section

FEBRUARY 3, 1932. — At 6 P.M. twenty-seven members and guests dined at Patten's Restaurant.

The meeting was called to order in the Engineering Societies' rooms at 7.15 P.M. The reading of the minutes of the previous meeting was omitted, as they have been printed in the JOURNAL.

The Chairman introduced Mr. E. Sherman Chase, of Metcalf & Eddy, who showed motion pictures of sewage treatment plants at Dayton and Akron, Ohio, Allentown, Pennsylvania, North Toronto, Ontario, and Manchester, Birmingham, Sheffield, and Bury, England. The speaker prefaced the pictures with a description of the plants and subsequently answered questions concerning them.

Mr. Edward Wright described a trip he made to several of the most prominent sewage treatment plants in the eastern United States.

Meeting adjourned at 8.45 P.M. Attendance 40.

GEORGE G. BOGREN, *Clerk.*

Designers' Section

FEBRUARY 10, 1932. — The regular meeting of the Designers' Section was called to order at 6.10 P.M. by the Chairman, Erwin Harsch, in the Affiliation Rooms.

The minutes of the January meeting were read and approved.

It was *Voted* that the Chairman appoint a nominating committee of three members to report at the March meeting. The committee selected consisted of Mr. Scott Keith, Chairman, Mr. William D. Henderson, and Mr. Norman P. Randlett.

The first speaker was Mr. Joseph Tucker of the Tucker Concrete Form Company. Mr. Tucker pointed out many economies in form work, and showed by his thorough discussion that forms are a problem in themselves, although many times not considered as such by the contractor. Diagrams were shown on the screen, indicating Mr. Tucker's method of laying out the work and numbering the pieces.

Mr. Edwin F. Allbright, of the Grid Flat Slab Corporation, spoke briefly on the use of steel domes as forms in the "Grid System." He illustrated his remarks by the use of pictures, showing the use of this system at various stages of the work.

A general discussion followed the talks.

Sixty-five members and guests were present.

The meeting adjourned at 7.50 P.M.

HERMAN G. DRESSER, *Clerk.*

APPLICATIONS FOR MEMBERSHIP

[February 20, 1932]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is there-are urged to communicate promptly any acts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of fifteen (15) days from the date given.

For Admission

Burnap, Joseph, Jr., Millbury, Mass. (Age 21, b. Grafton, Mass.) Student at Northeastern University and during co-operative periods has been employed by the State of Massachusetts. Refers to *H. B. Alvord, C. O. Baird, J. W. Copithorne, J. B. Komich, H. A. Racicot.*

Casella, Anthony, Athol, Mass. (Age 22, b. Athol, Mass.) Is a student at Northeastern University and during co-operative periods has worked as transitman and draftsman in Gardner, Mass., also for city engineer in same city, and as junior aid engineer for Commonwealth of Massachusetts. Refers to *H. B. Alvord, C. O. Baird, J. W. Copithorne, J. B. Komich.*

Drucker, Nathan N., Dorchester, Mass. (Age 22, b. Boston, Mass.) Graduate of Northeastern University in 1931, with degree of B.S. in civil engineering. During co-operative periods was employed by Ernest W. Branch as instrument man; from October, 1931, to December, same year, with Metropolitan Park Department as rodman. At present unemployed. Refers to *H. B. Alvord, C. O. Baird, Ernest Mathers, W. E. Nightingale.*

Hyland, William L., Norwood, Mass. (Age 31, b. Manchester, N. H.) Graduate of Massachusetts Institute of Technology in 1922 with degree of B.S. in mechanical engineering. Experience: 1922–25, with New England Power Company on hydraulic design and construction; 1925–26, with city of Manchester as assistant engineer on sewers; 1926 to date, with Fay, Spofford & Thorndike on sewerage and waterworks design and construction. Refers to *C. A. Farwell, R. W. Horne, C. M. Spofford, L. B. Turner.*

Kreusel, Adolph W., Brighton, Mass. (Age 21, b. North Andover, Mass.) Is a student at Northeastern University, and during the co-operative periods is employed by the Boston Consolidated Gas Company as transitman. Refers to *H. B. Alvord, C. O. Baird, Jr., C. S. Ell, W. E. Nightingale.*

Loring, Ira Raymond, Norwood, Mass. (Age 24, b. Walpole, Mass.) Is a student at Northeastern University. Refers to *H. B. Alvord, C. O. Baird, Jr., C. S. Ell, J. H. Lowe.*

Smetonis, Alphonse Bartholomew, Brockton, Mass. (Age 23, b. Brockton, Mass.) Graduate of Brockton High School and now a student at Northeastern University. Has been employed on the Fifteen Miles Falls hydro-electric project in Vermont for two years, and resumed his studies at Northeastern on the completion of this job. Refers to *H. B. Alvord, C. O. Baird, Jr., J. H. Lowe, G. H. Meserve, Jr.*

Tedesco, Anthony, East Boston, Mass. (Age 19, b. East Boston, Mass.) Is a student at Northeastern University. During co-operative periods has been employed by Aspinwall & Lincoln as rodman. Refers to *L. A. Chase, H. G. Gray, J. B. Komich, J. H. Lowe, C. A. Wolfrum.*

For Transfer from Grade of Junior

Hanson, Erling Albert, Jamaica Plain, Mass. (Age 27, b. Boston, Mass.) Graduated from English High School in 1922; from Northeastern University in 1926 with B.C.E. degree. Experience: one year with construction engineering department of New York, New Haven & Hartford Railroad; from 1926 to date, in contracting and building with his father. Refers to *H. B. Alvord, C. S. Ell, W. E. Nightingale, A. N. Rae.*

Harmaala, John O., Beverly, Mass. (Age 27, b. Gloucester, Mass.) Graduate of Northeastern University in 1928. During co-operative periods was employed by Bradford & Weed as rodman; by the Essex County engineer as transitman, and by Northeastern University as assistant in civil engineering department. From June, 1928, to January, 1929, was draftsman for Manchester, N. H., Engineering and Welding Company; January, 1929, to May, 1930, as vice-president and general manager of Manchester Engineering and Welding Company; from May, 1930, to date, as draftsman for Robert R. Evans, Essex County engineer. Refers to *H. B. Alvord, C. O. Baird, R. R. Evans, W. E. Nightingale.*

VERTIC, JOHN JOSEPH, Enfield, Mass. (Age 29, b. Newmarket, N. H.) Graduated from Lawrence High School in 1922, and from Northeastern University in 1926. During co-operative periods was employed by Fred W. Stowers, town engineer, Methuen, Mass.; also by B. S. Brown, Boston, and K. R. Kennison. After graduation was employed by the South Essex Sewerage District, where he was rodman and inspector from June, 1926, to May, 1930; in May, 1930, was employed by the Metropolitan District Water Supply Commission as inspector and now as transitman. Refers to *H. B. Alvord, N. L. Hammond, K. R. Kennison, W. E. Nightingale.*

ADDITION

Member

LORRIN M. PITTENDREIGH, 80 Columbia Street, Cambridge, Mass.

DEATH

THOMAS F. BOWES . died Jan. 24, 1932

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BOSTON SOCIETY OF CIVIL ENGINEERS

FOUNDED 1848

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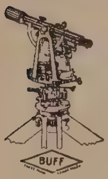

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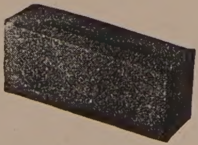

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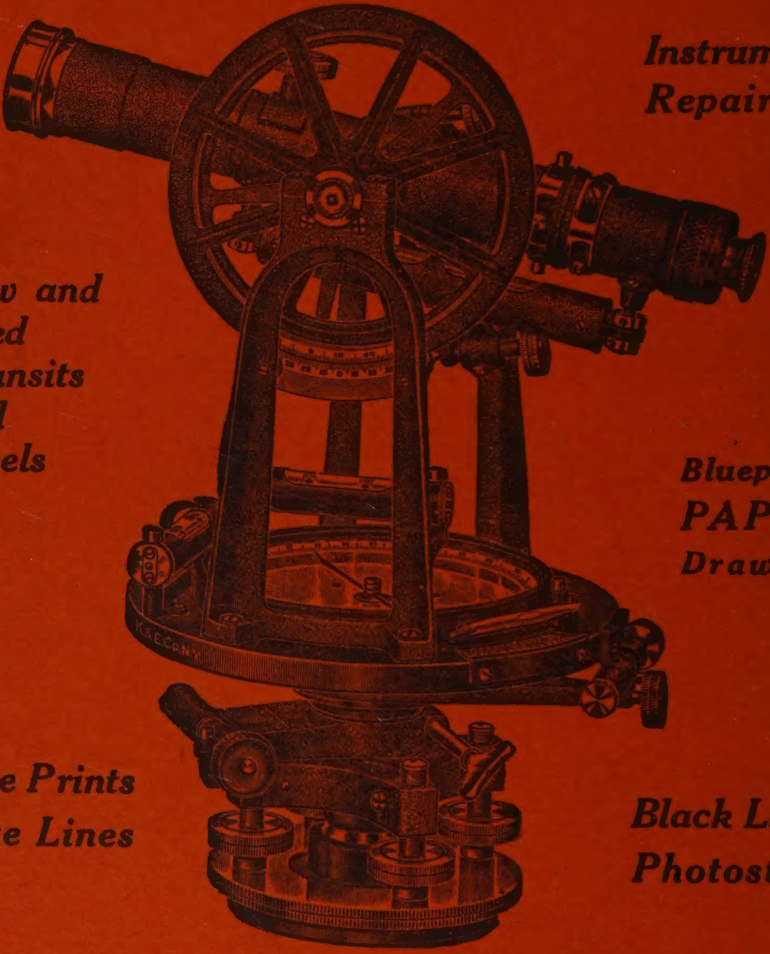

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